

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 20 MAR 2006



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Applicant's or agent's file reference F 04-056-PCT	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/JP2004/018521	International filing date (day/month/year) 06.12.2004	Priority date (day/month/year) 05.12.2003	
International Patent Classification (IPC) or national classification and IPC A01G31/00, C08F220/06, C08F20/06, C08F8/42, C08L33/02			
Applicant NIPPON SHOKUBAI CO., LTD. et al.			

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ sent to the applicant and to the International Bureau a total of 1 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

Date of submission of the demand 06.06.2005	Date of completion of this report 17.03.2006
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**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/JP2004/018521

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-56, 58-74	as originally filed
57	received on 14.06.2005 with letter of 10.06.2005

Claims, Numbers

1-22	as originally filed
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Drawings, Sheets

1/2, 2/2	as originally filed
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- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/JP2004/018521

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	11,14,19
	No: Claims	1-10,12,13,15-18,20-22
Inventive step (IS)	Yes: Claims	
	No: Claims	1 - 22 (insofar as novel)
Industrial applicability (IA)	Yes: Claims	1 - 22
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

1). The subject-matter of present claims 1 - 10, 12, 13, 15 - 18 and 20 - 22 is not novel (Art. 33 (2) PCT) for the following reasons:

WO 98/49252 A1 (= D1) discloses particulate polyacrylate gels for cultivating plants which have been modified by treating the alkali metal polyacrylate in aqueous solution with a polyvalent metal compound especially a calcium compound such as defined by present claim 13. The water absorbing speed of these modified gels is at least 30 and may be in the range of 30 - 100 g/g. (D1: page 4, line 5 - 16; page 5, line 19 - 23 and example II). These modified polyacrylate gels do not possess the adverse effects of alkali metal based polyacrylates.

EP 945 052 A1 (= D2) discloses particulate water retaining polyacrylic acid based hydrogels having a calcium ion absorption of less than 50 mg/g which are obtained inter alia by treating commercially available polyacrylates with calcium compounds such as CaCl_2 (D2: paragraphs 16, 67, 70-73 and example 2). The use of such gels results in a strongly improved germination of radish seeds (cf. D2: Table 3).

D2 further discloses in par. 123 - 124 that nutrient compounds may be introduced into the hydrogel by immersing the hydrogel in aqueous solutions of such nutrients as calcium nitrate, magnesium or ferrous sulfate.

Although a 'calcium gradual release index' as defined in present claims 2 or 3 has not been disclosed in D1 or D2, it appears that the products of D1/D2 necessarily possess this property given the identical methods of preparation. D1 and D2 hence anticipate the novelty of present claims 1 - 10, 12, 13, 15 - 18 and 20 - 22.

US 4,587,308 (= D3) discloses particulate water absorbent (polyacrylate) resins for horticultural uses having a high water absorbency which have been modified by treating the resins with an inorganic powder such as TiO_2 or Al_2O_3 (D3: col. 3, line 1 - 36; col. 4, line 21 - 26 and Examples 10/11 in Table 1).

These modified gels and their method of preparation anticipate the subject-matter of present claims 1, 4 - 10, 15 - 17 and 20 - 22.

JP 9 078 050 A (= D4) discloses particulate water retention resins based on polymethacrylic acid copolymers to which alkaline earth metal salts are added in order to improve the water retention and root affinity. It appears, that D4 anticipates the novelty of present claims 1 - 10, 12, 15 - 17 and 20 - 22.

2). Insofar as the subject-matter of the present claims differs from the closest prior art, which is defined by D1, it concerns obvious alternatives for measures and/or compositions as disclosed in D1:

Claim 11 defines the additional presence (apart from Ca compounds) of elements selected from Mg, Fe or Si. These elements are normal ingredients of nutrients/ fertilizers envisaged to be incorporated into water retention gels (e.g. D2, par. 123).

Claim 14 defines the ash of incineration as source of polyvalent metal compounds. Such ashes are known to contain plant nutrient minerals and their use in the water retaining materials as alternative for the Ca-sources of D1 hence is obvious.

The method of preparation as defined by claim 19 differs from the method as disclosed in D1 by mixing ingredients (A) and (B) in their powdered state before adding water or steam instead of adding powdered or slurried (B) to a solution of (A). It cannot be seen which non-obvious effects result from this in itself obvious measure.

It furthermore cannot be seen from the examples on file which particular technical problem has been solved by the presently claimed subject-matter having regard to the teachings of D1: it is well-known in the art, that polyacrylate based hydrogels negatively affect root origination and elongation due to its calcium adsorbing properties (D2, par. 11 - 15). Given the advantageous effects on seedling growth of the calcium modified hydrogels of D1 it appears that these hydrogels have solved the same technical problem as those of the present application by an enhanced calcium gradual release although this mechanism apparently was not recognized or tested by the inventors of D1.

In the absence of subject-matter that is clearly and unequivocally distinguished from the disclosures of D1, the inventive step underlying such subject-matter cannot be positively acknowledged.

3). The following further objections are raised:

- the presence of a calcium compound of not less than 5 wt. % is considered to be an essential feature of the claimed materials (see, e.g. page 28, line 21 - 24 of the description). This feature hence should be incorporated into the main independent claims (Art. 6 PCT in combination with Rule 6.3 (a) PCT).
- It further appears from Table 3, that the features as defined in claim 1 (water absorbing speed and average particle diameter) are not responsible for the desired advantageous effects: various comparative examples having values within the claimed scope obviously

do not possess the desired properties in terms of root development and/or sprout growth (see, inter alia, comparative examples 1 and 5 - 9).

Claims defining subject-matter solely by the use of these parameters hence do not solve the problem underlying the application over the whole scope claimed contrary to the requirements of Art. 33 (3) PCT.

- Table 1 as indicated on page 61, lines 13 and 18, apparently should read Table 3. Table 1 as present in the description (page 62, lines 29 - 32) obviously discloses the composition of the incineration ash as used in referential example 10.

- Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1, D3 and D4 is not mentioned in the description, nor are these documents identified therein.

before drying) - (weight (g) of polymer after drying)] / (weight of hydrated polymer (g) before drying)] $\times 100$

(9) Calcium gradual release index:

5 First, in a vessel of polypropylene (made by Teraoka K.K. and sold under the product code of "Type 24-0210-02") measuring 80 mm in inside diameter and 250 mm in height, 1 L of an aqueous calcium solution having a calcium ion concentration of 200 mg/L and adjusted to $25 \pm 0.5^\circ\text{C}$ was placed
10 and then a 1 g sample of water absorbent resin was introduced into the vessel, and they were stirred with a stirring bar (made by Sogo Rikagaku Glass Seisakusho K.K. and sold under the product code of "1065-10") 50 mm in length and 8 mm in diameter at a rotational frequency of 60 rpm for 48 hours. The stirring
15 was performed in a thermostat kept at a temperature of $25 \pm 1^\circ\text{C}$. After the 48 hours' stirring, the aqueous calcium chloride solution having the water absorbent resin dispersed therein was collected with a disposable syringe (inner volume 30 ml; made by Thermo K.K. and sold under the product code
20 of "SS-30ES") and the water absorbent resin reduced to a swelled gel was separated by filtration by the use of a filter (made by GL Science K.K. and sold under the product code of "Type 25A") to recover an aqueous calcium solution. The recovered aqueous calcium solution was assayed by plasma emission
25 spectral analysis to determine the amount of calcium (X mg/L). Besides, 1 L of an aqueous calcium chloride solution having a calcium ion concentration of 200 mg/L and having no water absorbent resin dispersed therein was directly stirred with the stirring bar mentioned above for 48 hours under the
30 aforementioned conditions. The aqueous solution stirred and passed the aforementioned disposable syringe and filter was assayed by plasma emission spectral analysis by way of a blank test to